



SS-15 BRI (ISDN 2 GSM) USER MANUAL



USER MANUAL

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1. INTRODUCTION

By purchasing SS-15 BRI (ISDN 2 GSM) you have opted for:

- cutting down the costs of your cellular calls;
- mobile-2-ISDN interface with LCR capabilities;
- excellent quality of audio signal;
- availability of SMS and data functions;
- convenient, easy to use e-mail to SMS and SMS to e-mail feature;
- perfect compatibility to ISDN private branch exchanges (PBX);
- routing functions assured even when used as standalone unit;
- full compatibility with GSM 900/1800 or 850/1900 networks;
- saving of ports in your PBX exchange and
- easy and quick installation and usage.

2. WHAT IS SS-15 BRI (ISDN 2 GSM)?

By interfacing between an ISDN phone exchange and the mobile telephony network (GSM 900/1800 or 850/1900) cuts down the costs of fixed-to-GSM and GSM-to-fixed calls.

ISDN 2 GSM was designed to be connected to any ISDN phone exchange so it meets standard ISDN PBX requirements.

It may be used as GSM interface for an ISDN a phone exchange. Even when used as standalone unit with an ISDN phone set it can still perform routing of the calls for minimum costs. Also, by means of a terminal adapter it can be used with analogue (standard) telephones or with a payphone.

The unit works primarily in voice mode by re-routing incoming or outgoing calls through the corresponding wireless network. This way there is only cost of a mobile-to-mobile call inside the same carrier network, instead of the cost of a fixed-to-mobile call.

The interface enables several types of ISDN connections and may be used for services such as call forwarding (conditioned or unconditioned), DISA and voice messages.

When connected to a computer, the SS-15 BRI (ISDN 2 GSM) may be used to receive and send out SMS's.

By connecting SS-15 BRI (ISDN 2 GSM) to an ISDN phone exchange, all local extensions can make calls to GSM networks while keeping down the costs. Also, when making a call the subscriber is no longer subjected to RF radiations from the cell-phone. The external antennas can then also be placed for optimal reception (higher intensity of the radio signal).

Since SS-15 BRI (ISDN 2 GSM) can send billing pulses, a public telephone (payphone) can also be used by means of terminal adapter.

Finally, the ISDN 2 GSM may be used as a small ISDN phone exchange by itself, since it can interconnect up to 8 ISDN local phones and perform automated routing of calls for minimum cost.



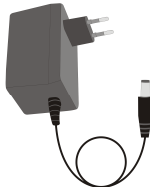
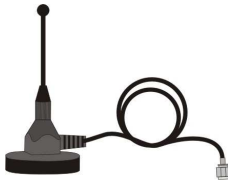
The unit includes the GSM modules, so it does not need supplementary devices (such as an external GSM phone) to work. Its two SIM cards allow routing the call through the corresponding GSM operator, for least cost.

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Its installation is simple; just insert the SIM cards and plug in the cables (serial configuration, ISDN lines, external antennas, power adapter). This comes very useful for the SOHO (small office/ home office) market.

3. PACKAGE CONTENT

Please ensure that all components are accounted for and that no damage has been sustained during transport.

Item	Image	Pcs/ Note
SS-15 BRI (ISDN 2 GSM) equipment		1
Serial programming cable for SS-15 ISDN 2 GSM		1 *
Power supply adapter 12VDC / 2,08A		1
External antennas		1-2 **
Wall mounting kit	-	1 ***
CD with OAM software	-	1 ****
User's manual	-	

Notes:

- * The package also contains two connecting cable for TE and NT interfaces
- ** Depending on what SS-15 BRI (ISDN 2 GSM) model it is (with one or two GSM modules) there will be one or two antennas.
- *** The kit for mounting the SS-15 BRI on a wall includes dowels, woodscrews, etc.
- **** OAM software supplied with the SS-15 BRI (isdncfg) includes functions for configuring (programming) the ISDN to GSM interface, routing of calls, sending and receiving of SMS's. It also includes online help with examples

4. INSTALLATION

4.1 IDENTIFYING THE CONNECTORS

The back of the enclosure of the SS-15 BRI (ISDN 2 GSM) unit features all the supply/voice/data connectors:

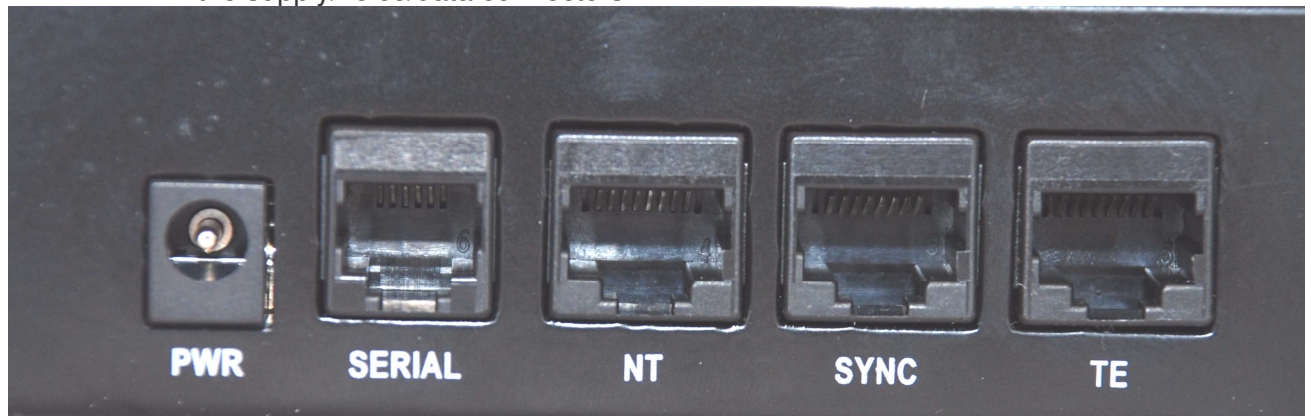


Figure 1. Identifying the connectors

- PWR:** Female connector, jack type, for the power supply adapter
- SERIAL:** Female RJ-11 connector with special pin-out, for the serial cable used for configuration (for the connection to PC a DB9 muffle is used)
- NT:** Network Termination for 4-wire ISDN phone line. Connects SS-15 BRI (ISDN 2 GSM) to the TE of the ISDN PBX or the ISDN phone set (analogue phone may be used via terminal adapter)
- SY:** Synchronization, connections paralleled with TE slot. Used for clock signal synchronization, when cascading several ISDN 2 GSM units together.
- TE:** Terminal Equipment connector for ISDN is used for connecting to an ISDN phone exchange or to the ISDN public telephony network and also, for connecting more than one SS-15 BRI (ISDN 2 GSM) unit to the same PBX.

The two FME connectors for the external antennas are located on top of the SS-15 BRI (ISDN 2 GSM), while the slots for the SIM cards and their pushbuttons can be found on the right side of the enclosure, under the LED indicators.

4.2 CONFIGURING THE SIM CARDS

The SIM cards that will be used with SS-15 BRI (ISDN 2 GSM) must be **activated** by the corresponding GSM operator. It must also be properly **configured** before insertion in the GSM slot of the equipment. The configuration of the SIM cards is performed using a GSM phone.

Disable request for PIN code – If the “PIN Code Request” option is disabled, any value can be inserted in the “Pin Code” field of the Programming Tool. When entering the correct PIN code, it will be stored in the equipment memory. The SS-15 unit must be connected with the computer that runs the Programming Tool through a serial connection in order to modify the “PIN Code” (for more details refer to the User Manual for the isdncfg program).

Disable GSM services – most GSM operators assure several services (redirection of calls, vocal mailbox) concerning the handling of incoming calls. These are very useful when the cell-phone is busy or disconnected; it is an advantage to use the call forwarding features provided by the GSM carrier. But when the SS-15 BRI (ISDN 2 GSM) interface is used together with a phone exchange it is generally better to disable those services because it can be performed locally with fewer costs.

Disable Auto-re-dialling and Auto-answer – these options must be disabled if they are provided by the GSM operator.

Turn off roaming - international roaming services allows one to make calls with the same GSM subscription when travelling in other countries (where the service provider has signed a roaming contract with the GSM operator). The roaming option should be **disabled**, because SS-15 BRI was designed to work with PBX or ISDN phones in stationary applications.

If roaming remains enabled, it is possible that when the local GSM carrier is interrupted, the ISDN 2 GSM interface will connect to a foreign mobile operator and the costs of the calls will be much higher.

Settings for configuration of the SIM cards

Description	Option
Select “OFF” for “Dial again – Interval”.	If this option exists
Select “OFF” for “Auto Answering”	Required
Select “OFF” for “Call Waiting”	Required

4.3 INSERTING THE SIM CARDS

The ISDN 2 GSM interface needs SIM cards for the corresponding GSM operators.

Each SIM card must be inserted in the corresponding slot of the SS-15 BRI (ISDN 2 GSM) unit. Depending upon the equipment model, it may feature one or two GSM modules, hence one or two slots for SIM cards.

The slots for SIM cards are located on the upper right side of the SS-15 BRI enclosure, under the LED indicators. To insert/ remove the SIM, use the removable tray (SIM holder) which is activated by a small yellow pushbutton.



Figure 2. Location of SIM slots

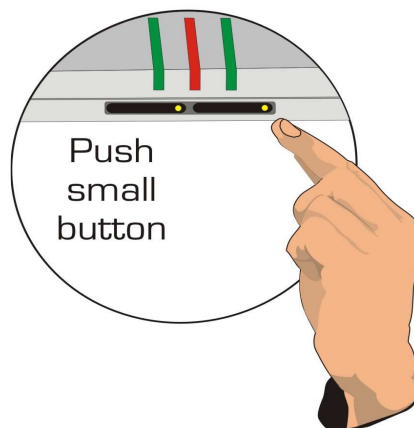
Note: To push the ejector button, because of its small size, one may need to use a tool with a small, hard tip (keys, pen, screwdriver or tweezers). Handle the SIM cards with care.

WARNING: Unplug the SS-15 unit from the main outlet before insert or replace a SIM card.

For each of the SIM card, follow these steps:

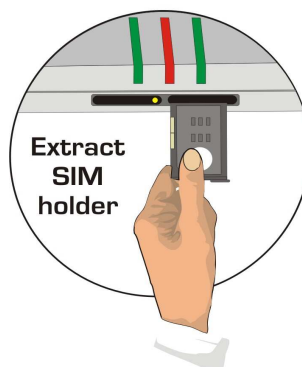
1. Press the little button to eject the SIM holder.

STEP 1



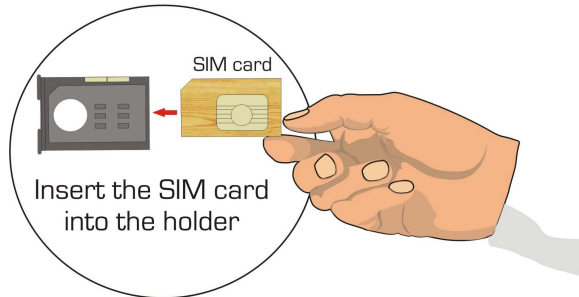
2. Pull out (extract) the tray (SIM holder).

STEP 2



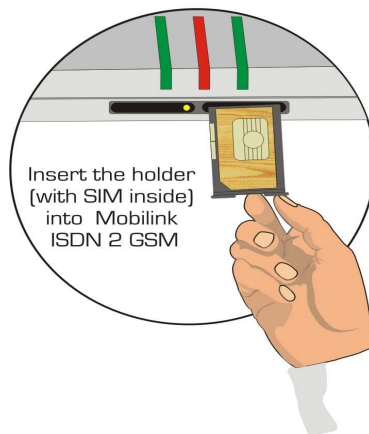
3. Insert the SIM card into the holder, as shown – with cut corner upwards and with contacts facing you.

STEP 3



4. Push the holder tray with the SIM inside back into the corresponding slot of the SS-15 unit

STEP 4



The steps described above should also be followed when the SIM cards already installed into SS-15 need to be replaced.

4.4 CONNECTING THE CABLES

Connect the data, phone and power cables as shown in the drawing below:

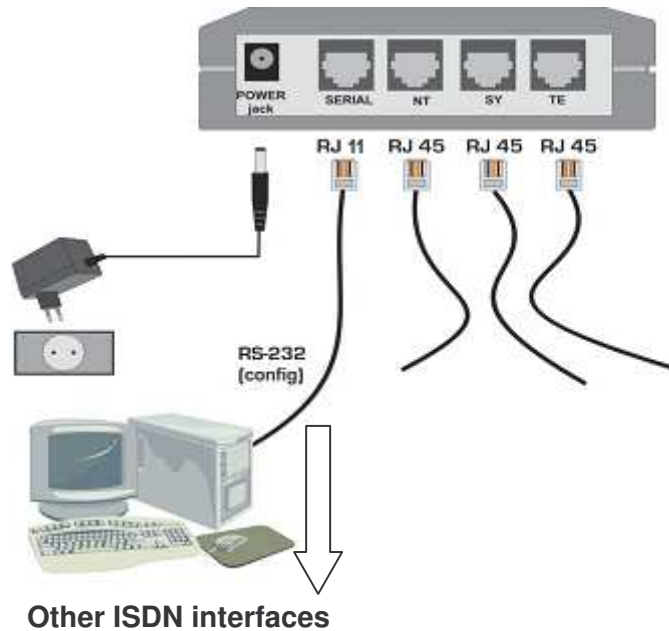


Figure 3. Connecting the cables

Use ISDN cables to connect the unit to the ISDN PBX (or other ISDN terminals). Connect the cables from the corresponding ISDN device to the SS-15 BRI unit. For more detailed information on correct connections refer to par. 5.2. "Modes of connection".

1. For each SS-15 BRI ISDN **interface**, insert one end of the 4-wire ISDN phone cable in the TE or NT connector of the SS-15 BRI (ISDN 2 GSM). The opposite other end of the cable must be connected to the corresponding local or junction interface of the ISDN PBX or to the ISDN phone. The pinout of RJ-45 connectors for TE and NT interfaces is shown in tables in par.4.9 "Pinout for connectors". Select the individual NT, TE or SY connections in accordance with par. 5.2. „Modes of connection". In order to achieve a good operation, the pattern of connections required for the application needs to be known (links required by the ISDN phone exchange or telephone terminals).
2. Serial programming connection – To be able to adjust configuration of the ISDN 2 GSM interface using the Programming Tool, the equipment must be connected to a PC. The connection is performed by means of a special cable that connects to the „SERIAL" slot of the SS-15 device. The serial connection is also necessary for sending and receiving SMS messages from the PC.
3. Insert the jack of the power supply adapter (shipped in the SS-15 BRI package) into the PWR connector. **Do not plug the adapter into the receptacle of the 230V ac mains outlet yet.**
If starting up the SS-15 BRI (ISDN 2 GSM) and the antennas are not connected, the transmitter of the GSM module could be damaged.

4.5

INSTALLING THE EXTERNAL ANTENNAS

SS-15 BRI (ISDN 2 GSM) features two RF connectors on top for connecting the antennas for the wireless network. The following may be used:

- the wideband antenna supplied with the package, with cable and magnetic base (see below characteristics) or

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- other kinds of external antennas with higher gain or directivity (Yagi), if the need arises.

The following table shows the main characteristics of the dual-band stick antennas with magnetic base (currently supplied with the SS-15 BRI (ISDN 2 GSM) package).

Frequency bands	GSM 890-960 MHz PCN 1710-1880 MHz PCS1850-1990 MHz
Gain	2 dBi
Polarization	Vertical
Base	Magnetic, 2,8cm
Cable	Type RG174, length 2,5 m
Connector	Female FME

The two antennas must be threaded to the FME male connectors located on top of the SS-15 ISDN 2 GSM unit, as shown in the following drawing.



Figure 4. Connecting external antennas.

Plug the cable connector and tighten the flange lightly, by hand.
Do NOT use a spanner or screw key, which could damage the antenna connectors.

The external antennas must be installed in a place with a good GSM signal strength. The antenna has vertical polarization; it must be placed in vertical or horizontal position, depending of the local field condition.

If the SIM cards used are for different GSM operators, it may be necessary to place each antenna in a location with maximum strength of the received signal from the respective GSM carrier.

SS-15 BRI (ISDN 2 GSM) and its antennas must be located as far as possible from equipment that is sensitive to electromagnetic interferences (radios, audio or video appliances, computer monitor, TV receivers etc). If placing the SS-15

BRI interface or its antennas too close to such appliances, their operation could be affected.

Note1: *The antennas of the SS-15 BRI (ISDN 2 GSM) interface send out RF energy so they should NOT be placed very close to people. Since the GSM interface transmits for longer periods of time, being used by several people (most of the calls of local subscribers are routed through it) the radiation will accordingly be **higher** than for a cell-phone used only infrequently, by a single person.*

Note2: *Remember to connect the antennas before powering up the SS-15 BRI, to avoid damage to the transmitters of the GSM modules.*

4.6 JUMPER SETTINGS

The SS-15 BRI (ISDN 2 GSM) features several jumpers located on the printed circuit board, inside the enclosure. These jumpers control functions seldom needed, therefore, under normal operation these settings do not need to be changed.

4.6.1. Bootloader enable

Use

If an abnormal interruption occurred in the loading of an image file, use the JP5 jumper.

To fix this problem, set the jumper on the JP5 pins to force the bootloader to start. In order to load a new image file please refer to the isdncfg OAM manual.

Remember to take the jumper off pins JP5 before resuming normal operation of the ISDN 2 GSM equipment.

Location

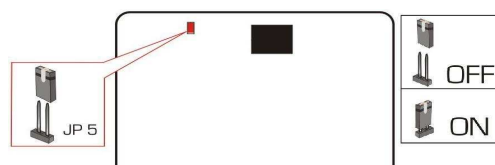


Figure 6. JP5 jumper location

Jumper JP5 is located near the top left corner of the printed circuit board of the SS-15 BRI. Immediately to the right of JP5 the connector for the external antenna can be seen. JP5 is alone (no other jumpers close to it) and it is in a vertical position.

4.6.2. Terminal resistors

Use

These pairs of jumpers (JAN1 and JAN2 for the NT interface, JAT1 and JAT2 for the TE interface) configure the impedance matching (termination) resistors for the respective interfaces.

By default, these jumpers are ON so the terminal resistors are connected. The jumpers should be taken OFF if terminal resistors are not required.

When several ISDN devices are connected to an ISDN line, the line must end with impedance matching resistors, also called terminal resistors. This is required, for instance, when cascading several SS-15 interfaces and using synchronization.

One solution for termination is to use a terminal block with matching resistors inside. But if the last device is an SS-15 BRI, the termination resistors that are included with the equipment can be used. Remember, out of several SS-15 BRI units cascaded on the ISDN line, only the last unit must have the termination resistors enabled.

Location

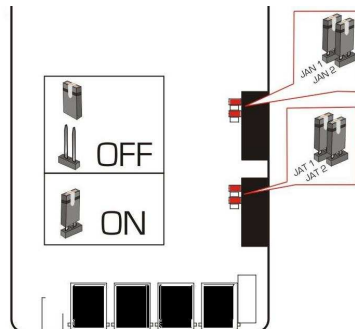


Figure 7. Location of JAT1, JAT2, JAN1 and JAN2 jumpers

The pairs of jumpers (JAN1 and JAN2 for the NT interface, JAT1 and JAT2 for the TE interface) are located towards the right edge of the SS-15 BRI printed circuit board, at middle-bottom. Each pair of jumpers is near a black rectangle (ISDN transformers). JAN1 and JAN2 are the first pair; below them is the second pair, JAT1 and JAT2 respectively. The jumpers are in horizontal positions.

4.7 POWER UP SS-15 BRI (ISDN 2 GSM)

Insert the jack of the power supply adapter into the PWR connector. Plug the adapter into the receptacle of the 230V AC mains outlet. The SS-15 BRI (ISDN 2 GSM) will start working immediately. The green LED indicator (PWR) should be lighting up.

Warning: To avoid accidents or damage to the equipment, follow the installation steps described earlier. The supply plug of the adapter must be the last connection made. Do NOT connect the cables for serial configuration, phone or PBX while the SS-15 BRI (ISDN 2 GSM) unit is powered. Also, don't take out the antennas while the SS-15 is in operation.

4.8

LED INDICATORS

The SS-15 BRI (ISDN 2 GSM) has three LED's as optical status indicators, shown in the figure to the right.

Figure 7: Location of the LED status indicators: from top downwards the GSM LED, the ISDN LED and the power supply LED.

The first two are bi-colour (red / green) while the Power led lights only green.



Functions of LED's status

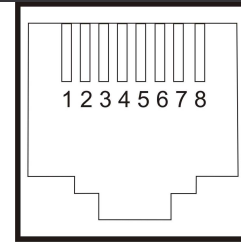
Each LED may light green or red, continuously or blinking with different frequencies, as shown in the table below:

LED	STATUS	SIGNIFICANCE
	This dual colour LED shows the status of GSM modules. It lights green to indicate GSM 0 and red to indicate GSM 1.	
Topmost (GSM)	Blinking fast, 5 Hz	The GSM module is initializing
	Blinking, 1 Hz	Wrong PIN number (PIN error)
	Blinking slow, 0.5 Hz	GSM module is searching for the network (antenna not installed, or SS-15 not in the coverage area of the GSM network)
	Off	GSM module has registered to the network and is in standby
	On, continuously	GSM module is busy (in a call or just allocated)
Middle (ISDN)	Information about synchronization of ISDN interfaces. Here green indicates the NT interface and red refers to the TE interface of SS-15.	
	Blinking 0.25 sec then one sec off	Interface not synchronized. For example, if the green LED lights 0,25 sec then the red LED lights 0,25 sec it means both interfaces are not synchronized.
	Off	The ISDN interface is synchronized
Lower (Power)	Lights continuously green	The supply voltage is present
	Off	There is no-supply voltage

4.9

PINOUT FOR THE CONNECTORS

The SS-15 BRI (ISDN 2 GSM) features four data connectors at the bottom of its case. All connectors are of the same type, female RJ-45, but they have different functions. Please read the paragraph carefully and perform the connections accordingly.



Serial connector

For programming the SS-15 BRI (ISDN 2 GSM) the special connection cable must be used. The special serial cable is included in the package of the SS-15 BRI (ISDN 2 GSM) equipment.

The end towards the SS-15 BRI features an RJ11 connector while the end towards the COM port of the computer features a standard female DB-9 connector.

In the drawing below the pin numbering can be seen (from left to right) of the RJ11 female connector of the SS-15 BRI and the corresponding male RJ11 male connector on the serial programming cable.

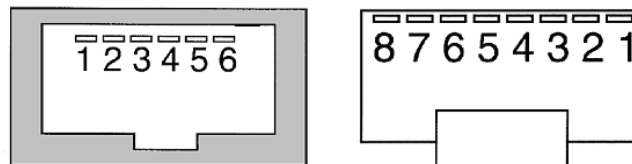


Figure 8. Serial connector

See table below for pinout of cable and its connectors.

RJ11	Symbol	DB-9	Signal
1	DSR	6	Data Set Ready, input
2	RxD	3	Receive Data, input
3	GND	5	Signal Ground
4	TxD	2	Transmit Data, output
5	DTR	4	Data Terminal Ready, input
6	CTS	8	Clear To Send, input

TE connector – used for connecting the SS-15 BRI TE interface.

The TE interface of the SS-15 BRI (ISDN 2 GSM) unit is used for connection to NT interfaces of the ISDN private branch exchange or of the ISDN public telephony network. TE interfaces are provided with embedded termination resistors. These resistors may be enabled by means of corresponding jumpers, the pair JAT1 and JAT2.

See table below for pinout of TE interface.

Pin	Signal
1	Not connected
2	Not connected
3	Tx
4	Rx
5	Rx
6	Tx
7	Not connected
8	Not connected

NT connector – used for connecting the SS-15 BRI NT interface.
The NT ISDN interface of the SS-15 BRI is to be used for connection to TE interfaces of the ISDN PBX or to ISDN terminals.

For pinout of NT interface of the SS-15 BRI:

Pin	Signal
1	Not connected
2	Not connected
3	Rx
4	Tx
5	Tx
6	Rx
7	Not connected
8	Not connected

SY connector

The Synchronization connector is internally paralleled to the TE interface of the SS-15 BRI.

This is used when connecting several SS-15 BRI (ISDN 2 GSM) units together, to ensure synchronous operation of all devices.

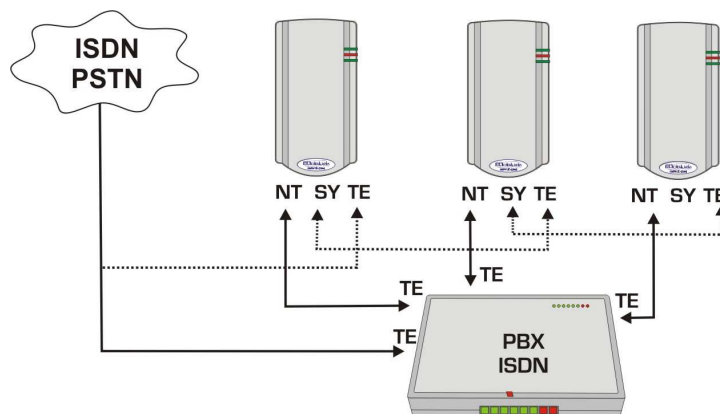


Figure 9. Usage of SY connector

For details see paragraph 4.2, about modes of connecting the SS-15 ISDN 2 GSM unit.

4.10 MOUNTING THE SS-15 BRI (ISDN 2 GSM) EQUIPMENT

When selecting the location for mounting the SS-15 BRI refer to the recommendations in par. 6.1.

The SS-15 BRI (ISDN 2 GSM) can be placed either in a vertical position on a wall or horizontally on a desk or in a shelf.

The SS-15 BRI (ISDN 2 GSM) and its antennas must be located as far as possible from equipment that is sensitive to electromagnetic interferences (radios, audio or video appliances, computer monitor, TV receivers etc). Also, the GSM antennas must be mounted in a place with maximum strength of the received signal.

For mounting the SS-15 BRI (ISDN 2 GSM) on a wall, the mounting kit must be used (plastic dowels, woodscrews, etc) provided by SS Telecoms.

Mark the position of a pair of holes on the wall, spaced at 55 mm apart.

Drill the holes in the wall.

Forcibly insert into the holes the plastic dowels.

Thread the metallic woodscrews into the plastic dowels leaving the end to protrude outside for some 5 mm.

Hang the case of SS-15 BRI (ISDN 2 GSM) in the two metallic woodscrews and push it down a little to get it fixed.



Figure 10. Mounting SS-15 on a wall

4.11 INSTALLING THE PROGRAMMING TOOL

The Programming Tool called ISDNCFG is required in order to configure and control the SS-15 BRI (ISDN 2 GSM).

It also allows the sending and receiving of SMS messages from the computer that is connected to the SS-15 BRI via serial cable.

This Operation, Administration, and Maintenance program runs under the Windows Operating System.

To install the program, connect the SS-15 BRI to the PC that will be used for programming, by means of the special serial cable for configuration.

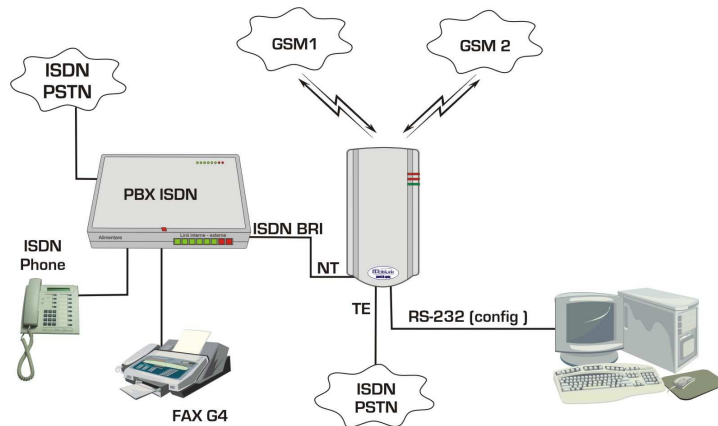


Figure 11. Configuring SS-15 via serial connection

Set the communication on the COM serial channel where the SS-15 BRI (ISDN 2 GSM) is connected.

Insert the diskette into the 3.5 inch diskette drive unit and copy the structure of folders and files to the hard disk drive.

Run the ISDNCFG.EXE file from the folder on the hard disk

By means of the graphic interface of the configuration program, begin to adjust the SS-15 BRI settings (parameters for GSM modules, ISDN TE and NT interfaces, routing table, CLIP table, name of connection, etc.)

Establish the settings according to the routing functions that the application requires.

For details, refer to the **Operating Manual** for the Programming Tool. The manual includes several examples of configuration of parameters for usual applications.

5. OPERATION AND MODES OF CONNECTION

5.1 ROUTING FOR LEAST COSTS

No matter which mode of connection is used, the purpose of the SS-15 BRI is to achieve Least Cost Routing of calls. The LCR function of the SS-15 BRI (ISDN 2 GSM) interface ensures that in each case calls (incoming or outgoing) are routed through the direction with minimum costs. For example, if a local subscriber of the PBX makes a call, the prefix will be analyzed and the call will be routed accordingly, either to the public ISDN network or to one of the GSM operators. This way, instead of paying for a fixed-to-mobile call, there will only be the low cost of a fixed-to-fixed or mobile-to-mobile call inside the same network. This holds true also for calls coming in from agents in the field who make calls from mobile phone - they will pay just for a mobile-to-mobile call, avoiding interconnection fees. Using the DISA feature, the mobile callers may get the extension they want, without need for a human operator of the PBX.

Alternatively, the two GSM channels of the SS-15 BRI may feature SIM cards for the same mobile provider, but with different subscriptions. The Programming Tool will select the best subscription for any given moment of time (for example, the operator that provides lower tariff by night or during weekends).

Another instance of getting lower tariff by using the SS-15 BRI is when several subscribers of the PBX make calls to a certain mobile provider. Since most of the calls to that provider will be routed through a specific GSM module of the

SS-15 BRI, for that module a SIM with convenient tariff rate (low cost per minute for a very large number of minutes used) may be used.

In case of connecting several SS-15 BRI (ISDN 2 GSM) units to an ISDN phone exchange, the possibilities of routing calls for least costs are even better. Firstly, there is no limitation to two GSM modules - modules with SIM cards for two or three mobile providers may be used, each with different subscription that allows a better tariff rate.

Secondly, if all GSM modules in an SS-15 BRI interface are engaged (busy), the call to a mobile network may not only be rejected but instead routed through another SS-15 BRI (ISDN 2 GSM) connected to the same PABX.

The Programming Tool uses CLIP to check the identity of the callers against a data base. Thus calling can be restricted to certain selected (authorized) subscribers, avoiding unnecessary costs.

Caller identification may be used for automated routing of calls.

All incoming calls that contain information about the phone number of the subscriber (ID) will be checked by the Programming Tool against the CLIP routing list. Depending upon the "Action" that has been set up, the program will route the call accordingly, to the operator of the PBX, to a certain local extension or will provide DISA tone.

DISA – direct inward access – allows callers to select the extension they want without the help from an operator, via DTMF codes. Also, they can dial out of the exchange.

If the incoming ID is missing, the default routing options apply.

With the "Nr. of Dialed Digits" option the SS-15 BRI makes the call immediately after receiving the last digit - any digit sent afterwards will be ignored.

5.2

MODES OF CONNECTION

There are a few options of connecting the SS-15 BRI equipment to an ISDN phone exchange.

The ISDN 2 GSM interface can be connected either as TE, when it acts as a terminal equipment, or as NT, when it simulates ISDN network.

It may also be used as a pass-through device that is "transparent" for the calls. In this case the SS-15 BRI (ISDN 2 GSM) is inserted between the public ISDN network and the PBX.

These three basic modes of connecting the SS-15 BRI can be combined in different ways, as shown further.

a) SS-15 BRI connected via NT to a TE junction of the PABX

The NT connector of the GSM-2-ISDN linked to the TE of the PABX.

The TE of the PABX goes to the public ISDN. The TE interface can be used to get the clock signal for synchronization, as shown below.

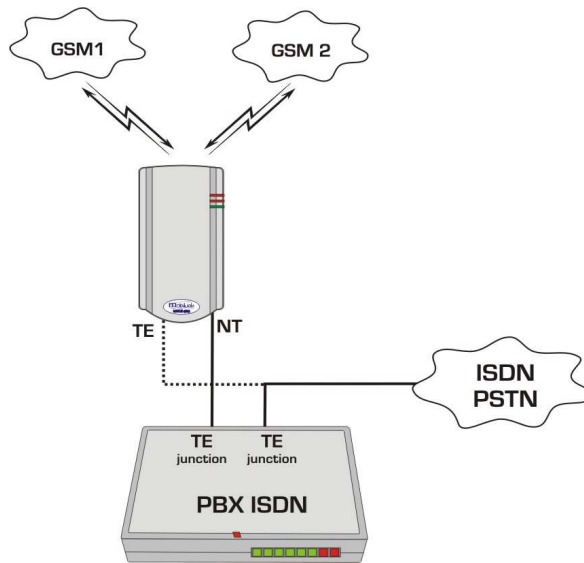


Figure 12. SS-15 BRI connected to TE junction of PBX

Outgoing from PABX

The PBX routes the calls to mobile networks through the SS-15 BRI unit. The SS-15 BRI may use one or two directions for this (DIR0 for module GSM0, one mobile network, DIR1 for module GSM1, the other mobile operator)

Incoming GSM to PABX

The decision is taken depending upon the CLIP GSM table or the GSM port settings if the incoming phone number is not found in the table.

The call is sent only through the SS-15 BRI's TE interface. In the CLIP-GSM table, the "ACTION" field value must be set on "NT" and the "Port" field from "GSM settings" menu will be set on "NT".

b) The SS-15 BRI connected via TE to NT local of PABX and via NT to TE junction of the PABX

The NT connector of the GSM-2-ISDN link to one TE junction of the PABX. Other TE junction of the PABX goes to the public ISDN network. The TE connector of the GSM-2-ISDN unit goes to the NT of a local board of the PABX

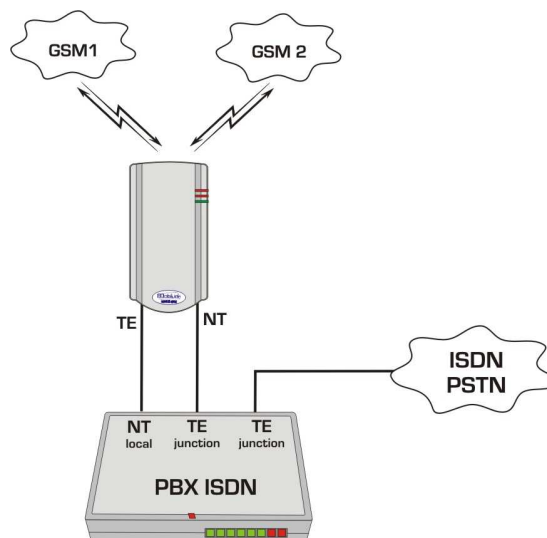


Figure 13. SS-15 BRI connected to PBX with both NT and TE interfaces

Outgoing from PABX

The PABX unit verifies the number dialled and routes the call for the public network through the dedicated interface and the call for the mobile network through the SS-15 BRI's NT interface. The SS-15 BRI unit selects one mobile network operator to send the call.

Incoming to PABX

Calls get into PABX via TE connector. When an incoming GSM call comes in, if the setting in the GSM window is Operator, the call will go to the local extension from Target. From the PABX the call is considered to be a local call. If the setting is DISA, the caller gets a DISA tone and can dial any local subscriber. Calls can also be made from the public network, acting as a local subscriber.

c) SS-15 connected to PBX on NT interface and to public ISDN via TE interface

The public ISDN network is connected directly to the SS-15 BRI equipment via TE interface. The NT connector is used to link to a TE junction of the PABX.

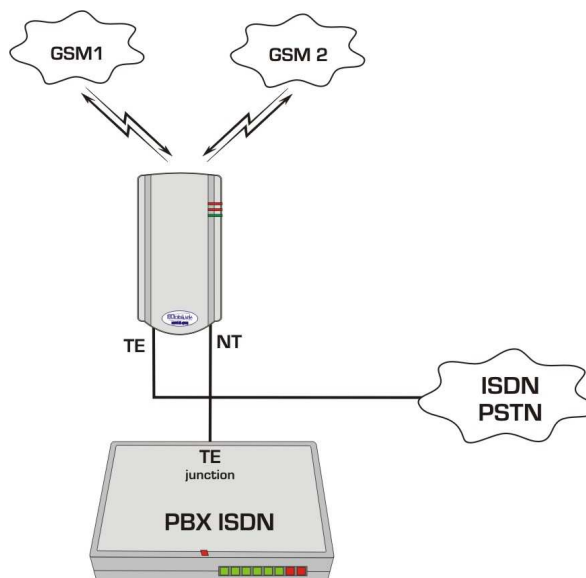


Figure 14. SS-15 BRI inserted between PBX and public network

Outgoing calls

In this case calls coming from PABX junction through NT connector of ISDN-2- GSM can be routed through one of the three directions: GSM0, GSM1 and TE (which goes to the public ISDN network).

The routing is performed by the SS-15 ISDN-2- GSM unit.

Incoming to PABX from ISDN network

The calls from the public ISDN are transferred transparently towards the PABX. For this, in the TE configuration window check "PassThrough" options.

Incoming to PABX from GSM network

The calls from GSM network are treated according to the specifications presented in paragraph "a".

d) SS-15 BRI connected to PABX via TE only

The TE interface of the SS-15 BRI is connected to the NT of a local board of the PABX.

The NT interface of ISDN-2- GSM is **not used** in this case.

The PABX connects to the public ISDN via another TE junction.

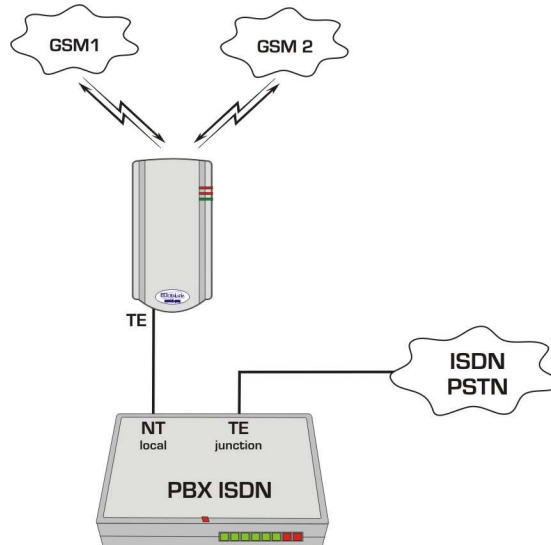


Figure 15. SS-15 connected to NT local of PBX

Outgoing from PABX

The local subscriber calls the number of the local extension on position where the SS-15 BRI is connected. The SS-15 BRI answers, takes over the numbering, then sends out the call into the adequate GSM network. The number of the mobile subscriber must be dialled in DTMF mode.

Incoming to PABX from the GSM network

As shown earlier, the call identity is checked with the CLIP-GSM table and the call is sent through the SS-15 BRI's TE interface to the PABX. If the call identity is missing or it can't be found in the CLIP-GSM table, the call will be routed according to the settings of the GSM module ("DISA" or "OPERATOR").

e) Using several SS-15 BRI (ISDN 2 GSM) units

There are situations when it is necessary to connect more than one SS-15 BRI unit to a PABX, e.g. when more than two mobile network directions must be used or there is a lot of traffic towards the mobile network.

SS-15 BRI (ISDN 2 GSM) USER MANUAL

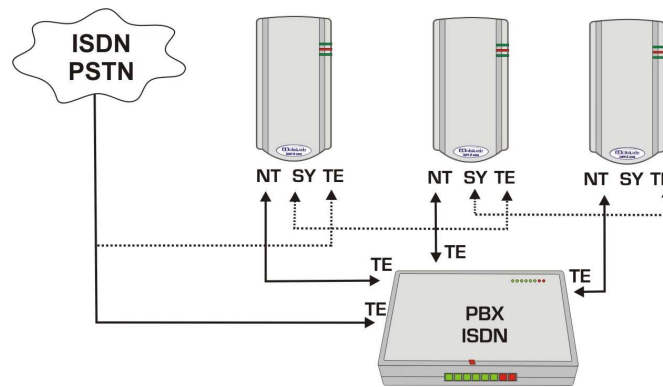


Figure 16. Cascading several SS-15 BRI units

To ensure synchronous operation of the SS-15 BRI units, clock synchronization is taken from the Public ISDN and goes to the TE connector of the first SS-15 BRI.

Refer to Figure 16 for the connection mode.

NOTE: When using more than one ISDN terminal on the same ISDN line (4 wire bus), the ISDN line must be ended with terminal resistors.

For this, a termination line jack (termination block) with adequate impedance matching resistors (value is 100 ohm) can be used.

Alternatively, if the last device is an SS-15 BRI ISDN, the embedded termination resistors must be used. Both NT and TE interfaces of the SS-15 BRI ISDN feature termination resistors which can be configured by means of jumpers.

The pair of jumpers JAN1 and JAN2 connects the matching resistors to the NT interface, while the pair of jumpers JAT1 and JAT2 connects the matching resistors to the TE interface of the SS-15 BRI.

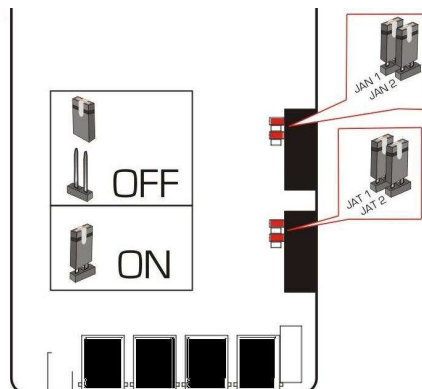


Figure 17. Location of JAT1, JAT2, JAN1 and JAN2 jumpers

By default, all jumpers are set, so termination resistors are connected.

NOTE: Take the jumpers OFF as required. In a configuration with several ISDN terminals connected together, only the last device in the line must have termination resistors.

TECHNICAL SPECIFICATIONS

GSM modules	
Mobile networks	Dual-Band EGSM900 and GSM1800
Compliant to	GSM phase 2/2+
Maximum RF output power	Class 4 (2 W) for EGSM900 Class 1 (1 W) for GSM1800
Control	via AT commands
Power consumption:	<ul style="list-style-type: none"> – Idle mode (registered) 25 mA – Speech mode 300 mA – Peak <2.5 A – Power down 50 mA – Sleep mode 3.5 mA
Reception sensitivity	-104 dBm
SIM card	3 V, plug-in card
Antenna connector	FSM, 50 Ω impedance
External antenna	Dual band, 3m long cable, magnetic base
Extra features	<ul style="list-style-type: none"> - DTMF (Dual Tone Multi Frequency) - Half rate, Full rate or Enhanced full rate - Echo cancellation and Noise reduction
Optical indicator	Dual colour LED, green for GSM 0 and green for GSM 1
Line (ISDN)	
Connectors	Standard RJ45connector for ISDN
ISDN protocol	EuroISDN, DSS - 1
NT interface	So, point to multipoint So, point to point
TE interface	So, point to multipoint So, point to point
SY	Synchronization, paralleled to TE
Optical indicator	Dual colour LED, red for TE interface and green for NT interface
Power supply	
Special adapter	Input: Mains 230 V AC 0,3A / 50Hz Output: jack, 12V DC / 2,08A
Serial interface	
Standard	RS-232
Connector	Dedicated RJ-45
Signals	RTS, DSR, RxD, TxD, DTR, CTS, GND.
Overall	
Operating temperature range	From 5 to 50°C
Humidity	10 to 80%, non-condensing
Dimensions (L x W x H)	222 x 115 x 32 mm
Weight	500 g – SS-15 BRI (ISDN 2 GSM)unit 1kg – the packed

6. OPERATING ENVIRONMENT

The SS-15 BRI (ISDN 2 GSM) was designed to work **inside** buildings, so it must be installed only in closed rooms or enclosures, where the environmental conditions should be inside the limits specified in the Technical Specifications table in paragraph 6.

Do NOT allow exposure to rain, dripping water, condensed humidity, mist, etc. and avoid dust and prolonged exposure to sun radiation.

In order to ensure an adequate working temperature, the ISDN 2 GSM interface must not be used close to heat sources or in direct sunlight.

Leave free space around, below and above the SS-15 BRI interface. This is needed both for connecting phone / data / antenna cables, and also for ventilation (natural air cooling to dissipate the heat generated during operation).

When the allowed operating temperature is exceeded this may not have an immediate, visible effect on the SS-15 BRI unit, but it can result in unreliable operation, accelerated ageing and diminishing of lifetime.

SS-15 BRI (ISDN 2 GSM) must NOT be used in a flammable or explosive environment, or in locations where toxic, aggressive, corrosive or flammable gases may accumulate.

When cleaning the case of the unit, take care not to use aggressive liquids or solvents.

The SS-15 BRI should be handled with care, to avoid mechanical shocks and blows.

It must not be used in places with a high level of vibrations such as manufacturing floors, heavy-duty trailers or railway cars.

The SS-15 BRI (ISDN 2 GSM) should not be used in an environment with a high level of EMI (electromagnetic interference), near copiers, PC monitors, TV sets or other audio-video appliances or high power equipment such as electric motors or heaters.

When selecting the location for installing the SS-15 BRI (ISDN 2 GSM) and its external antennas refer to the recommendations described in paragraph 4.10.

The SS-15 BRI (ISDN 2 GSM) does not include materials or components that are harmful to the environment.

When the life cycle of this equipment is finished and it cannot be repaired or re-used anymore, dispose of it in accordance with applicable laws and legal regulations.

7. BENEFITS

The SS-15 BRI (ISDN 2 GSM) creates a direct voice connection between a digital fixed telephone and the GSM wireless communications network. The cable of the ISDN phone exchange or ISDN terminal is connected to the SS-15 BRI (ISDN 2 GSM) unit which gives access to the mobile network without the need for a connection (landline) to the fixed telephony operator.

If having to call from a mobile terminal, the number of the SIM inserted into the slot of the SS-15 BRI (ISDN 2 GSM) unit is dialled and the call will be automatically directed to the fixed phone.

The main advantage of using the ISDN 2 GSM is eliminating interconnection costs between fixed and mobile telephony networks. The SS-15 BRI is generally connected to an ISDN PBX that provides routing and distributes the calls to all local subscribers. It can also be useful for private persons or small companies who don't have access to the fixed telephony network. With the SS-15 BRI (ISDN 2 GSM) GSM it will be possible to use an ISDN fixed phone to call anywhere through the GSM telephony network.

The benefits include:

- The immediate installation of an ISDN connection in remote areas, that may not be reached by phone lines, but which are inside the coverage area of the GSM mobile network
- Easy use of an ISDN terminal (telephone sets), for calls to a GSM network.
- Elimination exposure to the radiation of cell phones. The GSM modems and the external antennas of the SS-15 BRI (ISDN 2 GSM) will NOT be located near the user or close to Hi-Fi audio or video appliances that could be sensitive to EMI.
- Sending and receiving SMS's from the computer that is connected to the SS-15 BRI, by means of its convenient e-mail to SMS and SMS to e-mail features.



6. CONTACT DETAILS

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